FORMAT TO UPLOAD SYNOPSIS

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8.	ABSTRACT Abstract should not contain any [E.g. !@ #$%^&*() etc. and more than 2048 characters will not be acceptable]	The study investigates the physiological efficiency of four selected judo throwing techniques—Uchi-mata, Seoi-nage, O-goshi, and Sode-tsurikomi-goshi—among national-level male judokas aged 16–25 years. The objective is to determine which techniques are most energy-efficient and effective, using physiological parameters such as SpO2, heart rate, and lactic acid concentration. Data will be collected post-execution of throws using standard tools like oximeters, lactate meters, and heart rate monitors. The research employs a comparative design and statistical analysis through one-way repeated measures ANOVA to evaluate differences between techniques. The study is expected to provide insights into biomechanics, grip strength relevance, and the impact of training interventions on performance. Ultimately, the findings aim to support the development of optimized training programs, reduce injury risk, and enhance competitive performance.

9.	**KEYWORDS** **(please mention more than one keyword)**	**Uchi-mata, seo-nage, O-goshi, and Sode-tsurikomi-goshi**
10.	**LANGUAGE**	**English**
11.	**ATTACH SYNOPSIS** **(PDF not more than 10 MB)**	**Yes**

EVALUATING THE PHYSIOLOGICAL EFFICIENCY OF SELECTED THROWING TECHNIQUES IN JUDO

SHORT SYNOPSIS

Submitted in partial fulfilment of the requirement of the degree of

DOCTOR OF PHILOSOPHY

to

Lakshmibai National Institute of Physical Education, Gwalior

By

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Acad./Ph.D./22-23/486

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DEPARTMENT OF HEALTH SCIENCES

Certificate

I hereby declare that the short synopsis **"Evaluating the Physiological Efficienccy of Selected Throwing Techniques in Judo"** being submitted in partial fulfilment of the requirement for the degree of Doctor of Philosophy in Physical Education under Department of Health Sciences of Lakshmibai National Institute Of Physical Education, Gwalior during the academic year 2022-2023.

It is a bonafide record of original work carried out under the supervision of Dr. Sanjeev Yadav and has not been submitted in full or part to any other university or institute for a degree or diploma.

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INTRODUCTION

Judo is a martial art and Olympic sport that has been growing in popularity worldwide. It is characterized by its emphasis on throws and grappling Techniques, which are designed to subdue an opponent using leverage and balance. In competitive judo, throwing Techniques are essential, and matches are often won or lost based on the successful execution of a throw. Therefore, the ability to execute efficient and effective throwing Techniques is a fundamental aspect of the sport.

Despite the importance of throwing Techniques in judo, there is still much to be learned about their efficiency and effectiveness. Several studies have investigated the biomechanics of specific throwing Techniques in judo, but a comprehensive evaluation of their efficiency across a range of Techniques has not been undertaken. Furthermore, little is known about the specific factors that contribute to the success or failure of each Techniques.

To address these gaps in the literature, the current study aims to evaluate the efficiency of selected throwing Techniques in judo. Four commonly used Techniques will be the focus of this investigation. These Techniques were selected based on their prevalence in competition and their potential to be effective in a range of situations.

The evaluation of efficiency will be conducted by analysing data from competitive matches, as well as a systematic review of existing literature. The analysis will focus on several factors, including the biomechanics of the Techniques, the role of grip strength, and the impact of training interventions on throwing performance. By examining these factors, we can gain valuable insights into the efficiency of each Techniques and the key factors that contribute to their success or failure.

One critical aspect of the evaluation will be the biomechanical analysis of the Techniques. Biomechanics is the study of the mechanics of the human body, and it has been widely used to evaluate the effectiveness of different Techniques in sports. In judo, several studies have investigated the biomechanics of specific throwing Techniques, but little is known about the biomechanical differences between the four Techniques that will be evaluated in this study. Therefore, a biomechanical analysis of each Techniques will be conducted to identify the key factors that contribute to their success or failure.

Another important factor that will be evaluated is the role of grip strength in the execution of throwing Techniques. Grip strength is critical in judo, as it allows athletes to maintain control over their opponents and execute Techniques effectively. Several studies have investigated the relationship between grip strength and throwing performance in judo, but little is known about the specific Techniques that are most affected by grip strength. Therefore, we will examine the role of grip strength in the execution of each of the four selected Techniques.

Finally, we will examine the impact of training interventions on throwing performance. Training interventions are an essential aspect of athletic development, and they can have a significant impact on performance. Several studies have investigated the effects of different training interventions on throwing performance in judo, but little is known about the specific Techniques that are most affected by these interventions. Therefore, we will evaluate the impact of plyometric training on the performance of each of the four selected Techniques.

In conclusion, the current study aims to evaluate the efficiency of selected throwing Techniques in judo. By conducting a systematic review of existing literature and analyzing data from competitive matches, we can gain valuable insights into the efficiency of each Techniques and the key factors that contribute to their success or failure. This research can have implications

for the development of training programs and strategies for athletes and coaches and can ultimately lead to improved performance and increased success in competition.

This study has ultimately followed purposes:

1. The aim of this research is to evaluate the efficiency of selected throwing Techniques in judo.
2. The aim of this research is to determine the efficiency and effectiveness of each Techniques across a range of factors.
3. The aim of this research is to lead to improved performance and increased success in competition.
4. The study can have implications for the development of training programs and strategies for athletes and coaches.

Statement of the problem

"Evaluating The Efficiency of Selected Throwing Techniques In Judo."

Objectives of the study

The following research objectives have been proposed:

1. To figure out which Judo Techniques requires least energy for its application.
2. To know the order of energy consumption out of selected throwing Judo Techniques.
3. To analyse the selected Techniques and determine contribution to success.
4. To evaluate the efficiency and effectiveness of each of the selected throwing Techniques.

5. To provide recommendations for the development of training programs and strategies that can improve throwing performance for athletes and coaches.
6. To contribute new knowledge to the field of judo and potentially have practical applications for improving the sport.

Hypotheses

For the fair functioning of study, the following hypotheses have been formulated:

$H_0$1: It is hypothesized that SPo2 observation for all the selected Judo throwing Techniques will not differ significantly.

$H_0$2: It is hypothesized that heart rate reading for all the selected Judo throwing Techniques will not differ significantly.

$H_0$3: It is hypothesized that lactic acid concentration reading for all the selected Judo throwing Techniques will not differ significantly.

Delimitations

Taking the ease of control factor in mind and for conducting the research study in an efficient manner the following delimitations have been formulated:

1. The present study will be delimited to Judo throwing Techniques only.
2. The present study will be delimited to National level Judokas whose training age is greater than 8 years.
3. The present study will be delimited to male Judokas of Indian origin.
4. The present study will be delimited to Judokas of 16 to 25 years of age group only.

5. The present study will be delimited to judokas who are mentally and physically fit with no history of any severe injury.
6. The present study will be delimited to Judokas who have participated in junior/senior nationals and or All India Inter-Varsity.

Limitations

Use of Portable equipment for collection of data will be considered as limitation of the study.

Significance of the study

The present study may be of very much useful to the future researchers and can contribute to society in following ways:

1. The findings of this study may provide valuable insights into the efficiency and effectiveness of specific throwing Techniques in judo, allowing athletes and coaches to optimize their training and enhance performance in competitions.
2. The findings of the study can assist judo athletes in making strategic decisions during matches by understanding which throwing Techniques are most efficient against different opponents and in various competitive situations.
3. Injury Prevention: By evaluating the efficiency of throwing Techniques, the study can contribute to identifying safer and more effective execution methods, potentially reducing the risk of injuries associated with improper Techniques application.
4. Skill Development: The research can aid in the development of comprehensive training programs and coaching strategies that emphasize the specific technical elements required for efficient execution of the selected throwing Techniques.
5. Training Optimization: The study can guide coaches and trainers in designing targeted training interventions, drills, and exercises to improve the efficiency and

effectiveness of throwing Techniques, leading to more effective training sessions and skill acquisition.

6. Competitive Advantage: Understanding the most efficient throwing Techniques can provide judo athletes with a competitive edge, as they can focus their training efforts on mastering Techniques that are more likely to succeed in matches.

7. Performance Evaluation: The research can establish objective criteria for evaluating the efficiency and effectiveness of throwing Techniques, allowing for standardized performance assessments and comparisons across different athletes and training interventions.

8. Coaching Guidance: The findings can offer valuable guidance to judo coaches, enabling them to provide targeted feedback and technical corrections to athletes, ultimately improving their throwing Techniques and overall performance.

9. Sport Science Application: The study's insights can contribute to the broader field of sport science by adding to the body of knowledge on throwing Techniques in judo, which can be applicable to other combat sports and movement disciplines.

CHAPTER-II

Review of related literature

Before starting a research work it is must to know what work has already been done, what variables have been studied, what were the outcomes of their study? Studying those previous work may answer to questions like what can be added to previous work. Why is it needed to conduct the present research? What will be the scope of research work? Who will be benefited with your work? so far in the concerned field. In this chapter the work done by previous researchers in related area of interest have been presented.

- **Segedi & Sertic (2014)**The study "Classification of Judo Throwing Techniques According to Their Importance in Judo Match" aims to classify and rank throwing Techniques based on their significance in actual judo matches. Through an analysis of match data, the researchers developed a classification system that categorized Techniques into high or low importance. High-importance Techniques demonstrated greater success rates, scoring potential, and strategic value, while low-importance Techniques had lower success rates and limited applicability. The study provides valuable insights for athletes, coaches, and referees, aiding in training, strategy development, and understanding the Techniques that have the greatest impact on match outcomes.
- **(Sertić & Segedi, 2012)** The study titled "Structure of Importance of Techniques of Throws in Different Age Groups in Men Judo" examines the significance and effectiveness of throwing Techniques in men's judo across different age groups. The researchers analyzed data from judo matches involving various age categories to determine the importance and success rates of different throwing Techniques. They

found variations in the importance and effectiveness of Techniques across age groups, suggesting that certain Techniques may be more effective or strategic depending on the age and skill level of the judoka. This study provides valuable insights for coaches, athletes, and referees in understanding the dynamics of throwing Techniques in men's judo across different age groups.

- **(Weigelt et al., 2011)**This study explores the cognitive representation of a throwing Techniques in expert judo practitioners and investigates technological methods for assessing individual skill levels in high-performance sports. The researchers examined how expert judo athletes mentally represent and perceive throwing Techniques, using advanced technology to assess cognitive processes. The study highlights the potential of technological tools for diagnosing and evaluating individual skill levels in high-performance sports, offering valuable insights for enhancing training methods, talent identification, and performance optimization in judo and other competitive sports.
- **(Sterkowicz et al., 2013)**This study employs a biomechanical perspective to examine the Techniques most utilized during judo competitions at the London Olympic Games. The researchers conducted a detailed analysis of the matches, focusing on the frequency and biomechanical characteristics of the employed Techniques. The study identifies the specific throwing Techniques that were frequently executed by elite judo athletes during the Olympic tournament, shedding light on the strategies and tactics employed at the highest level of competition. The findings provide valuable insights for coaches, athletes, and researchers in understanding the prevalent Techniques and biomechanical aspects of high-level judo performance.

- **(Santos et al., 2014)** This study focuses on the three-dimensional evaluation of the throwing Techniques commonly employed in judo competitions. Using advanced motion capture technology, the researchers analyzed the kinematic characteristics and key biomechanical parameters of these Techniques. The study provides a comprehensive understanding of the execution and technical aspects of the frequently used throwing Techniques in judo. The findings offer valuable insights into the optimal body movements, joint angles, and timing required for effective execution of these Techniques. This research contributes to the enhancement of training methods, technical instruction, and performance analysis in judo.
- **(Kato & Yamagiwa, 2022)** This study explores the use of machine learning to predict successful throwing Techniques in judo based on factors related to the athlete's kumite posture. The researchers collected data on various postural factors during judo matches and trained a machine learning model to identify patterns associated with successful throws. The study demonstrates the potential of machine learning in analyzing and predicting throwing outcomes in judo. The findings can be applied to enhance training strategies, tactical decision-making, and performance evaluation in judo competitions.
- **(Serti, n.d.)** This study investigates the relationship between specific anthropometric variables and the quality of throwing Techniques performance in judo. The researchers measured various anthropometric characteristics of judo athletes and evaluated the quality of their throwing Techniques through objective performance assessments. The study explores how factors such as body composition, limb length, and proportions influence the effectiveness and efficiency of throwing Techniques in judo. The findings provide insights into the role of anthropometric variables in judo performance and can aid in the

development of training programs tailored to individual athlete characteristics for improved throwing Techniques proficiency.

- **(Singh et al., 2022)** This study utilizes video-based biomechanical analysis to examine the shoulder impact kinematics in two judo throwing Techniques: Tai-Otoshi and Morote-Seoi-Nage. The researchers collected and analyzed video footage of these Techniques, focusing on the specific shoulder joint movements during impact. The study provides detailed insights into the kinematic patterns and characteristics of the shoulder joint during the execution of these throws. The findings contribute to a better understanding of the biomechanics involved in these specific judo Techniques, which can inform training, Techniques refinement, and injury prevention strategies
- **(Ishii et al., 2018)** The study compares the kinematics of the Seoi-Nage judo Techniques between elite and college-level athletes. The researchers conducted a kinematic analysis, examining the body movements, joint angles, and timing of the Techniques's execution in both groups. The study found differences in the kinematic characteristics between elite and college athletes, highlighting variations in Techniques efficiency and execution. These findings offer valuable insights into the biomechanical aspects of the Seoi-Nage Techniques and provide a basis for understanding the factors contributing to successful execution in judo at different skill levels.
- **(Miarka et al., 2012)** The study investigates the differences in time-motion performance between different age groups in judo competitions. The researchers analyzed the time spent in various activities such as standing, gripping, throwing, and groundwork in judo matches across different age categories. The study found variations in time-motion performance among the age groups, suggesting

differences in the tempo, intensity, and strategies employed during matches. These findings provide valuable insights into the physical demands and tactical considerations in judo across different age categories, aiding in the development of age-specific training programs and performance optimization strategies.

- **(Rexhepi & Hraski, 2011)** This study examines and compares the biomechanical characteristics of two judo throwing Techniques: Osoto Gari and Uchi-Mata. The researchers analyzed spatial parameters (such as distance and angle), temporal parameters (such as timing and execution speed), and velocity parameters (such as linear and angular velocities) of the Techniques. The study highlights the similarities and differences in the biomechanical profiles of Osoto Gari and Uchi-Mata, providing valuable insights into the execution dynamics and technical requirements of these throws in judo.
- **(Franchini et al., 2013)** This study focuses on analyzing the time-motion characteristics and physiological demands of judo combat. The researchers conducted a comprehensive analysis of judo matches, examining the duration and intensity of different activities, such as standing, gripping, throwing, groundwork, and recovery periods. Additionally, the study investigated the physiological responses during judo combat, including heart rate, blood lactate levels, and perceived exertion. The findings provide insights into the physical demands and physiological requirements of judo competition, aiding in the development of training programs, conditioning strategies, and performance optimization for judo athletes.covering six dimension viz., Positive Self Evaluation, Perception of reality, Integration of Personality, Autonomy, Group Oriented attitudes, Environmental Competence. It was found that children of both private and the government schools

scored 'poor' in all the dimensions of mental health, and also the groups are alike in their mental health as no significant difference was noticed in any dimension of mental health

CHAPTER III

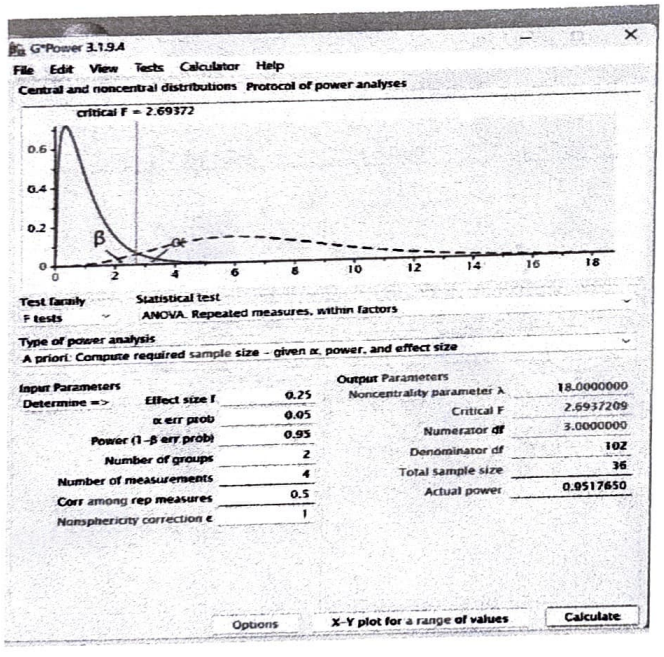
Methodology and procedure

The purpose of this study is to determine the efficiency of selected throwing Techniques in judo. In this chapter the design of the study, selection of the subjects, selection of the variables, selection of tools, description and administration of tests, Statistical procedure have been discussed.

Selection of subjects

For the purpose of the study the subjects will be selected randomly. 40 subjects (National and All India inter university Level Male Judokas) will be selected from judo specialization. Players who have minimum eight year of experience will be selected for the study. To maximize internal and external validity of the study the whole sampling will be done through random sampling method. So that every subject will have equal chances of being selected in sample.

To determine sample size G*Power software was used:



SELECTION OF VARIABLES

Independent Variables

1. **Judo Throwing Techniques**

Judo throwing Techniques was selected through observation method by analyzing and using multimode. The bouts of major competitions like Olympic Games, World Championships, or any other major international tournaments of last two year will take into consideration.

a. Uchi-mata
b. Seo-nage
c. O-goshi
d. Sode-tsurikomi-goshi

Dependent Variable

2. **Physiological parameters**
    a. SPO2
    b. Lactic Acid Test
    c. Heart Rate

SELECTION OF TOOLS

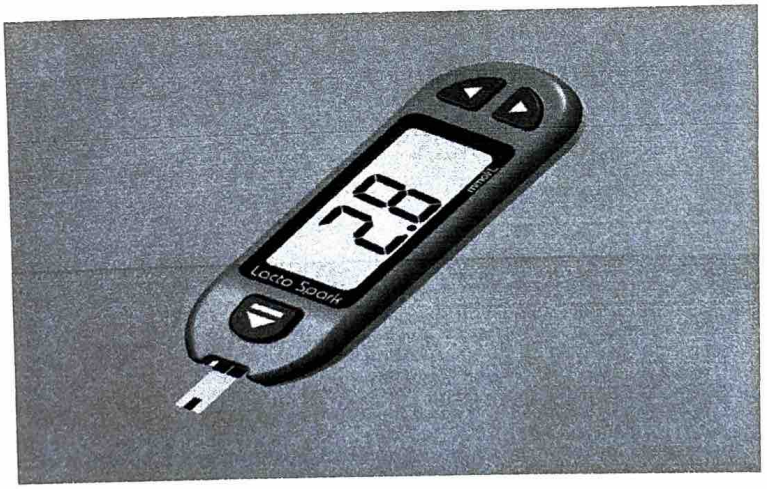
SP_O2 will be check through oximeter.

Company name: - **Vandelay**

Model name: - **Pulse Oximeter Fingertip C101H1 - Blood Oxygen Meter SpO2 & Pulse monitor**

Lactic Acid Test through a Lactate meter

Company name: - Lacto Spark



Heart Rate will be track through heart rate monitor.

Company name: **-Polar**

Model no: - H10

ADMINISTRATION OF TEST

Test will be conducted on judo mats judokas will wear Gi (judo dress) data of one judoka at a time will be taken after tori(thrower) will finish 25 throws on uke (throw receiver). Then data of heart rate will be taken through heart monitor and data of SPO2 will be taken through oximeter last the data of lactic acid concentration will be taken through Lactate meter. same is to be repeated every time.

STATISTICAL PROCEDURE

The present study is comparative in nature. To provide statistical authenticity to the findings of this study descriptive statistics and One Way Repeated Measure ANOVA will be applied in following manner. All the statistical analysis will be done with the help of SPSS software version 23. For all the statistical analysis the level of significance will be set at 0.05.

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